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THESIS

ANALYSIS OF THE U.S. ARMY ASSIGNMENT PROCESS: IMPROVING EFFECTIVENESS AND EFFICIENCY

by

Todd R. Wasmund

June 2001

Thesis Advisor:	William R. Gates
Associate Advisor:	William D. Hatch, II

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Since the conclusion of the Cold War and subsequent downsizing, the U.S. Army has struggled with the challenge of recruiting and retaining the highest quality soldiers to ensure future readiness. Each year, the Army plans and executes over 100,000 permanent change of station assignments for its 345,000 enlisted soldiers. The inherently complex challenge of assignment planning consists of balancing Army requirements and readiness with soldiers' professional needs and personal preferences. The Army's centralized and hierarchical assignment process could be improved using proven information technologies. Specifically, the process could be made more efficient using web-based markets and intelligent agents to more effectively plan and assign soldiers to billets. This thesis evaluates the strengths and weaknesses of the Army's assignment process and its outcomes, compares and contrasts it with the Navy's assignment process, estimates and evaluates the utility of one- and two-sided matching processes using a computer simulation, and makes recommendations, where appropriate.

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Todd R. Wasmund
Captain, United States Army
B.S., United States Military Academy, 1991

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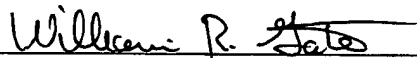requirements for the degree of

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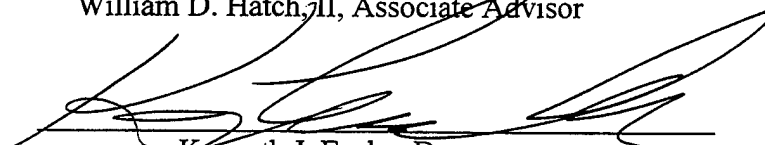
NAVAL POSTGRADUATE SCHOOL
June 2001

Author: _____
Todd R. Wasmund

Approved by: _____
William R. Gates, Thesis Advisor

_____
William D. Hatch, II, Associate Advisor

_____
Kenneth J. Euske, Dean
Graduate School of Business and Public Policy

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ABSTRACT

Since the conclusion of the Cold War and subsequent downsizing, the U.S. Army has struggled with the challenge of recruiting and retaining the highest quality soldiers to ensure future readiness. Each year, the Army plans and executes over 100,000 permanent change of station assignments for its 345,000 enlisted soldiers. The inherently complex challenge of assignment planning consists of balancing Army requirements and readiness with soldiers' professional needs and personal preferences. The Army's centralized and hierarchical assignment process may be improved using proven information technologies. Perhaps the process could be made more efficient using web-based markets and intelligent agents to more effectively plan and assign soldiers to billets. This thesis evaluates the strengths and weaknesses of the Army's assignment process and its outcomes, compares and contrasts it with the Navy's assignment process, estimates and evaluates the utility of one- and two-sided matching processes using a computer simulation, and makes recommendations, where appropriate.

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A. OVERVIEW

This thesis investigates and analyzes the U.S. Army's enlisted assignment process. It describes the assignment process, key stakeholders involved and their concerns, and the policies that guide the process. It examines advantages and disadvantages of the current assignment process and identifies possible opportunities for improving it in the future.

B. BACKGROUND AND REASONS FOR STUDY

Since the conclusion of the Cold War and subsequent downsizing, the U.S. Army has struggled with the challenge of recruiting and retaining the highest quality soldiers to ensure future readiness. Defined by the Army Soldier Quality Program, a high quality recruit is a high school diploma graduate whose Armed Forces Qualification Test (AFQT) score percentile is in the top half of the national population. (AR 600-3) In order to make the Army an employer of choice for the current generation of young adults, it is necessary to understand the myriad of factors that affect their decision to serve in the military.

Factors external to the Army include political and economic conditions, family influences and general attitudes toward military service. Increasing numbers of American youth are unfamiliar with the military and the value of military service because, compared to previous generations, fewer families have role models who have served in uniform. "The unprecedented and possibly unending prosperity in the civilian sector combined with a commonly accepted notion of an ill-defined post-Cold War military role, a decreased propensity to enlist and lower societal esteem afforded to

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military service have the potential to change the Army forever. Increasingly, the Army will find it more difficult to attract, recruit and retain high-quality individuals to fill its ranks." (Chambers) In fact, the Army missed its recruiting goals in 1998 and 1999, and made its goal in 2000 with the help of increased commitment of resources, including more recruiters and higher enlistment bonuses. Challenges in recruiting increase the importance of implementing policies to retain sufficient quantities of high quality soldiers to meet the readiness goals of the Army.

Internal to the Army, factors include operations tempo and quality of life issues that affect individual soldiers and their families. Two years after the Gulf War, shortly after the Army and other U.S. services achieved peak operational readiness, the draw down began in earnest. Since September 1992, enlisted operating strength in the U.S. Army has declined by more than 25%, while its operating tempo has increased by approximately 400%. (Active Army Enlisted Master File) Further, the Defense Manpower Data Center (DMDC) reported in the *1999 Survey of Active Duty Personnel*, that Army soldiers spent more time deployed from their permanent duty station (81.1%) than the other branches of the U.S. military. The strain caused by this high level of operating tempo manifests itself in sagging morale and ultimately, in poor retention.

Soldiers' quality of life is affected by the frequency and duration of deployments, resources available for training, quality of leadership, perceived opportunities for personal and professional development, pay and benefits, and assignment opportunities. Among those who responded to the *1999 Survey of Active Duty Personnel*, more than 85% reported that on-base quality of life services, programs, and facilities are generally available, which contributes positively to the overall satisfaction of service members and

their families. Additionally, under the leadership of President Bush, the current administration and Congress generally support improved compensation (pay and benefits) for the nation's military. While these issues play an important role in a soldier's overall satisfaction with the Army, executing an efficient and effective assignment process remains essential.

Each year, the Army plans and executes over 100,000 permanent change of station assignments for its 345,000 enlisted soldiers. (Piskator) The inherently complex challenge of assignment planning consists of balancing Army requirements and readiness with soldiers' professional development needs and personal preferences. The Army's centralized and hierarchical assignment process could be improved using proven information technologies. Specifically, the process could be made more efficient using web-based markets and intelligent agents to more effectively plan and assign soldiers to billets. This thesis evaluates the strengths and weaknesses of the Army's assignment process and its outcomes, compares and contrasts it with the Navy's assignment process, estimates and evaluates the utility of one- and two-sided matching processes using a computer simulation, and makes recommendations, where appropriate.

C. RESEARCH QUESTIONS

1. Primary Research Question

What is the overall efficiency and effectiveness of the Army's current assignment process?

2. Subsidiary Research Questions

Who are the stakeholders in the assignment process, and what are their concerns?

What positive aspects of the Army's assignment process should be preserved?

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What pathologies, or deviations from an efficient process exist, and what are their effects on retention?

What comparisons can be made between the Army and Navy assignment processes?

What potential benefits, if any, can be gained by using intelligent agent technology in the Army and Navy assignment processes?

D.   SCOPE AND LIMITATIONS

The scope of the thesis will include a thorough assessment of the Army's assignment process, related policies and procedures, and the potential benefits of implementing intelligent agent technology in the process. This study will be limited to the process for assigning active duty enlisted soldiers. Every effort will be made to collect objective data, however, quantitative data obtained through interviews and questionnaires will be inherently subjective.

E.   ASSUMPTIONS

1. This thesis assumes that the reader has a general understanding of military assignment processes. Analysis and Findings are found in Chapter V, and are part of a larger study of U.S. military assignment processes. Additionally, Appendix A provides a list of acronyms used in this thesis.

2. It is also assumed that data obtained from the Defense Manpower Data Center survey (DMDC), and responses obtained in questionnaires and personal interviews with various stakeholders accurately reflect the attitudes and opinions of typical Army soldiers.

F.   ORGANIZATION

The methodology used in this thesis research will consist of the following steps:

Conduct a literature review of books, magazine articles, the Internet, and other library information resources. Conduct a thorough review of Army policies and procedures as delimited in manuals and regulations relating to the Army's enlisted assignment process. Compare and contrast the Army's assignment process with the Navy's detailing process. Employ a computer simulation to estimate and evaluate the utility of one-and two-sided matching processes using a computer simulation. Identify and examine implications of employing intelligent agent technology in future assignment processes.

G.   BENEFITS

This study identifies the pathologies of the U.S. Army's assignment process. It is part of a larger study, being conducted by Professors Bill Gates and Mark Nissen at the Naval Postgraduate School, to examine using proven technologies to improve the assignment processes in the U.S. military services. Desirable potential outcomes include a more efficient and effective assignment process yielding improved job matches for soldiers and commands leading to increased job satisfaction, that results in better job performance and higher retention.

H.   CHAPTER SUMMARY

As the premier ground force of the U.S. military, the Army must attract and retain the highest quality American youth. Young Americans today enjoy unprecedented career and educational opportunities, and in order to compete with employers in the private sector, other branches of the military, and other government agencies, the Army must

become an employer of choice. It must meet prospective and current soldiers' expectations for personal preferences, professional development, compensation and quality of life for themselves and their families. Meeting this challenge includes executing an assignment process that is efficient and effective in satisfying the interests of all involved.

II. OVERVIEW OF ENLISTED ASSIGNMENT PROCESS

A. ORGANIZATIONAL STRUCTURE

The objective of Army manpower management, described in Army Regulation 570-4, Manpower Management, is to properly man Army forces in support of national security missions. Introduction of new doctrine, advanced technology, modern equipment, and force design must result in a credible land power deterrent and fighting force for the future, while assuring the greatest manpower productivity possible.

Manpower management focuses on accurately identifying the human resource requirements (in terms of both quantity and quality) necessary to perform specific tasks and upon the organization and position structure in which they will be most efficiently and economically used. This includes justifying these requirements in the Total Army Analysis (TAA), the Army's Planning, Programming, Budgeting, and Execution System (PPBES), and allocating available resources against validated requirements. Manpower management functions relate closely to other resource management actions. Specific manpower functions include requirements determination, documentation, allocation, utilization, and analysis and evaluation.

Manpower requirements are based on the most effective and efficient organization and, therefore, represent the minimum essential numbers of civilian and military positions needed to accomplish valid mission responsibilities for both TDA and MTOE organizations.[1] Army manpower requirements are determined within established

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[1] Table of Distribution and Allowances (TDA) organizations normally serve institutional support functions. They include the Army's training base and other vital supporting organizations. Modified Table

manpower constraints in order to accomplish national strategic goals, in coordination with the Department of Defense (DoD) Planning, Programming and Budgeting System (PPBS).

Authorization documents provide organizational structures supported by Army resources against which units will be organized in the current, budget and first program years. They provide a record of approved organization structure, mission, and capabilities, personnel requirements and authorizations, and equipment requirements and authorizations.

The Program and Budget Guidance (PBG) distributes Army military and civilian manpower authorized spaces to Major Army Commands (MACOMs) and operating agencies for reallocation to subordinate echelons.

Manpower requirements are composed of military and civilian personnel as well as contractor support required to execute the mission of the organization. How these different types of personnel may be used in the best interests of national defense forms the basis for utilization policies.

The continual analysis and evaluation of missions, priorities, guidance, constraints, and available resources form the basis of manpower assessments and validation. (AR 570-4)

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of Organization and Equipment (MTOE) organizations perform the warfighting missions of the Army. MTOE organizations include deployable combat forces.

1. Army Personnel Proponent System

The Army Personnel Proponent System is designed to accomplish Army manpower management objectives, and is organized into eight personnel life-cycle management functions. These functions are structure, acquisition, individual training and education, distribution, deployment, sustainment, professional development and separation. (AR 600-3) This thesis is concerned with the distribution function for enlisted personnel.

2. Military Personnel System

Within the Army Personnel Proponent System, soldiers are distributed using the two-dimensional Military Personnel (MILPER) System. The peacetime mission of the MILPER System provides services to commanders, soldiers, family members and retirees. During wartime, the MILPER System serves four purposes.

1. Directs the personnel portion of the Army's wartime command and control system.
2. Collects, processes, and manages combat-essential MILPER information and executes commanders' decisions.
3. Delivers replacements, mail and other vital wartime services to commanders and soldiers on the battlefield.
4. Ensures the Tactical MILPER units execute the MILPER system and at the same time, prepare for rapid deployment in support of their wartime mission.

An overarching concept called the managerial framework is used to direct, manage and operate the MILPER system. The managerial framework subdivides the MILPER system into a diverse set of manageable segments called functions. There are twenty-seven MILPER functions including awards and decorations, band operations, enlisted promotions and reductions, leaves and passes, recruiting and retention, reassignment and others. Nineteen of the MILPER functions are normally executed

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during combat. Reassignment is a peacetime function that in war is performed as a part of replacement operations. The remainder of this chapter will describe the peacetime reassignment processes for enlisted personnel.

B. ARMY REASSIGNMENT PROCESS FROM A MICRO PERSPECTIVE

This section provides a detailed view of how the Army determines the positions that need to be filled, and who will fill them. It is adapted from Army Regulation 600-8-11, which describes the Reassignment function of the Military Personnel System.

1. Enlisted Personnel Assignment System

The Enlisted Personnel Assignment System seeks to place the right soldier in the right job at the right time. The primary goal of the system is to satisfy the personnel requirements of the Army. Secondary goals are to equalize desirable and undesirable assignments by assigning the most eligible soldier from among those of like Military Occupational Specialty (MOS) and grade; equalize hardships of military service; assign each soldier so he or she will have the greatest opportunities for professional development and promotion advancement; and meet the soldier's personal desires. (AR 614-200) The primary goal of serving the needs of the Army and the secondary goals of serving soldiers' interests often conflict, and they require assignment managers to perform a difficult and delicate balancing act using the Enlisted Personnel Assignment System.

2. Enlisted Distribution Target Model

Described in Army Regulation 614-200, Enlisted Assignments and Utilization Management, the Enlisted Distribution Target Model (EDTM) is an automated system that creates enlisted distribution targets by Military Occupational Specialty (MOS), grade

and Unit Identification Code (UIC). The model fills each UIC reflected in the Personnel Manning Authorization Document (PMAD) with projected available inventory from the MOS Level System (MOSLS) according to DCSPER Distribution Policy.

The EDTM constrains the assignment process to coincide with the projected operating strength targets. It represents the assets the Army realistically expects to be available for distribution. The model targets each UIC for fill according to the priority given to the unit. Therefore, the possibility exists (depending on the fill priority and projected inventory) for a unit to be targeted at less than authorized strength.

The allocation of requisitions for each of the requisitioning activities will be limited to the command's share of available inventory, determined by the EDTM. Requisitions are allocated to the field using the Enlisted Distribution Assignment System.

3. Enlisted Distribution Assignment System

The Enlisted Distribution Assignment System (EDAS) is the primary tool that assignment managers use to achieve the Army's goal of placing the right soldier in the right job at the right time. EDAS is a complex automated system that enables assignment managers to manage each step of the enlisted personnel assignment system. Beginning with the requisition, EDAS matches available soldiers with available positions, nominates the best qualified, enables assignment managers to verify nominated soldiers, and issues assignment instructions to verified soldiers.

Figure 2.1 summarizes the Enlisted Personnel Assignment System, beginning with the approved requisition from the field. Steps in the process are described in greater detail in the paragraphs that follow.

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          ┌─────────────────────┐
          │ Requisition generated │
          │     by the field      │
          └──────────┬──────────┘
                     │
          ┌──────────▼──────────┐
  ───────▶│      PERSCOM        │
          └──────────┬──────────┘
                     │
          ┌──────────▼──────────────┐
  ───────▶│ Requisition matched by   │
          │ computer against soldier's│
          │ qualifications recorded on│
          │ Enlisted Master File (EMF)│
          └──────────┬──────────────┘
                     │
          ┌──────────▼──────────┐
          │    Assignment       │
          │    nomination       │
          │    procedure        │
          └──────────┬──────────┘
                     │
   Rejected ┌────────▼────────┐ Accepted
  ◀─────────│  Verified by    │────────▶
            │ assignment manager│
            └─────────────────┘
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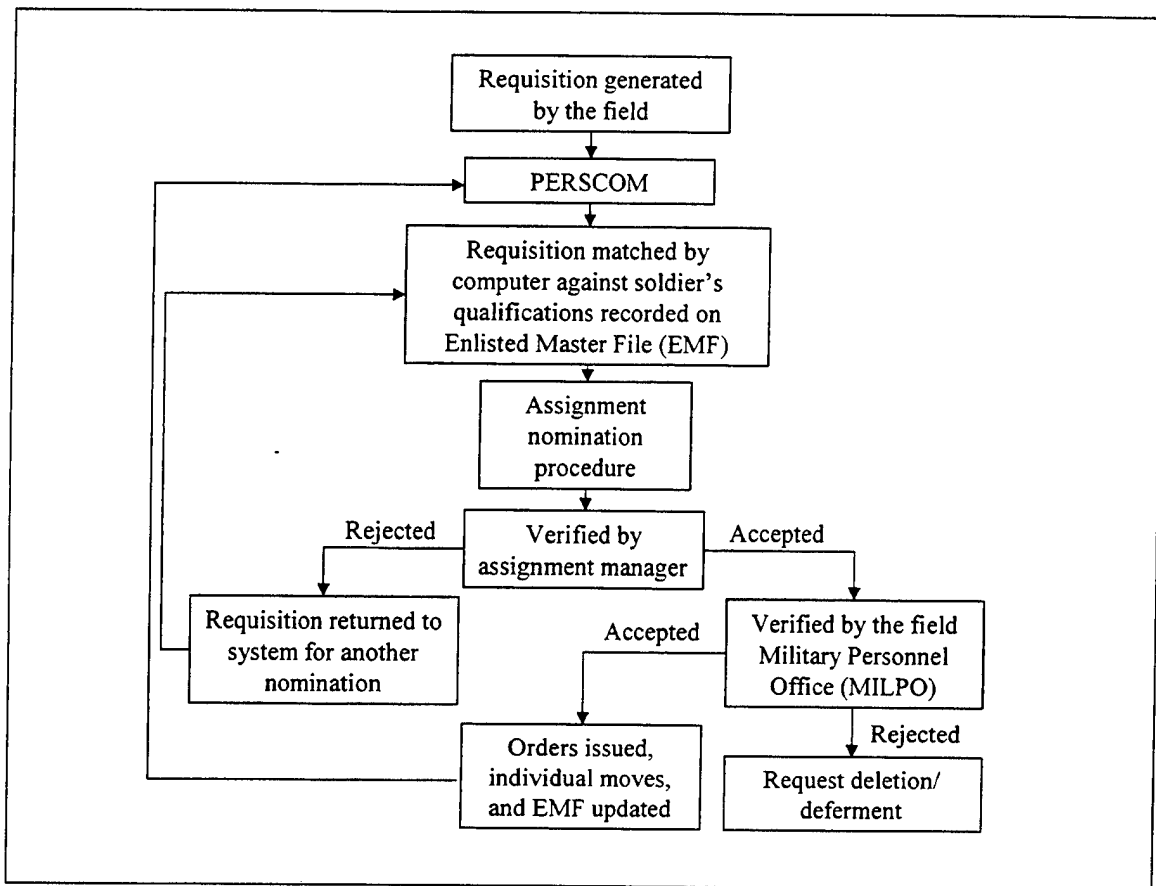
Figure 2.1. Flow Diagram of the Enlisted Personnel Assignment.

From: AR 600-8-11

Boxes:
- Requisition returned to system for another nomination
- Orders issued, individual moves, and EMF updated (Accepted)
- Verified by the field Military Personnel Office (MILPO)
- Request deletion/ deferment (Rejected)

a. ***Generating Requisitions***

Normally, the assignment process is initiated monthly when the Total Army Personnel Command (PERSCOM) develops requisition allocations consistent with Department of Defense (DoD) and Army manpower policies, guidance and authorization documents. PERSCOM forwards requisition allocations, based on MOS and grade, to the requisition authorities. Requisition authorities include Headquarters, Department of the Army (HQDA) agencies and activities, and Major Army Commands (MACOMs). The Military Personnel Division (MPD) or Personnel Service Company (PSC) of each requisition authority then compares authorized and projected positions with current

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assigned strength and known or projected gains and losses to confirm PERSCOM's allocations. The MPD or PSC then expands the MOS and grade allocation to a detailed requisition, with special instructions if required, and forwards these expanded requisitions back to PERSCOM. PERSCOM reviews, edits and passes valid requisitions to EDAS.

(1)   Availability of Soldiers for Reassignment. Soldiers become available to be applied against requisitions for various reasons. Solders who enlist in the Army are available for assignments after completing training and receiving an MOS. Soldiers who meet minimum Time In Service (TIS) requirements are also available for reassignment when they have: volunteered for reassignment; completed an oversea tour of duty; completed schooling or training; completed stabilization; or completed normal time on station in the Continental United States (CONUS).

b. Matching Soldiers to Requisitions

EDAS is used to assign all enlisted soldiers except those completing Basic Training (BT) or Advanced Individual Training (AIT). EDAS is an automated nomination and assignment procedure that compares qualitative requirements recorded on requisitions against selected qualification factors for each soldier. Some of the major qualifications considered include grade, MOS and skill level, Skill Qualification Identifier (SQI), Expiration Term of Service (ETS), months since last PCS and/or months since return from overseas (to ensure stabilization), soldier's availability month compared with requirement month, and, finally, the soldier's area of preference.

Each soldier is compared to each requisition and given a numeric score for every requisition for which he or she can be nominated. Comparing the requisition's qualitative requirements and the soldier's qualifications derives scores. Once every

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soldier's record has been reviewed and points have been awarded for a qualitative match to each requisition, a group of nominations is selected that provides the best overall requisition match in terms of quantity and quality.

Assignment preferences of the soldier are considered, but the needs of the Army are given primary consideration. Soldiers are assigned to their preference only if the needs of the Army can also be served.

c. Assignment Nomination

The nomination procedure in EDAS has three basic goals. First, each valid requisition will have at least one soldier nominated to it, provided sufficient soldiers are available for assignment. Second, requisitions will be filled by relative priority. When a shortage of soldiers exists, the shortage will be shared proportionately by all requisitioning activities according to priority. Finally, soldiers will be nominated to an assignment for which they are qualified.

d. Assignment Verification

Assignment managers at PERSCOM verify nominations produced by EDAS, and after reviewing all available information, either accept a soldier for the assignment or reject all nominees and return the requisition to the selection process for new nominations. Qualified individuals may also be selected manually to match the requisition regardless of a nomination by EDAS.

Each week, PERSCOM transmits Assignment Instructions (AI) for each approved nomination to both losing and gaining commands. (To allow for proper review by losing commands, the transmission of assignment instructions to gaining commands is delayed until 5 months before the soldier's arrival month.) The next step is a pivotal

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point in the assignment process: the losing command verifies the assignment. Because of delays in reporting and errors in the databases, selected individuals may not qualify for the assignment. If the soldier does not qualify or cannot qualify in time to meet the requirement, a deletion or deferment request must be submitted. If the individual is qualified and the assignment is consistent with announced Department of the Army (DA) policy, the local MPD or PSC of the losing command accepts the assignment. Issuing the necessary orders for travel finishes the assignment process. (AR 600-8-11)

C.   NEED FOR AN ALTERNATIVE APPROACH
1. Effective versus Efficient

Chapter IV, Methodology, of this thesis defines effectiveness and efficiency as they apply to the assignment process. In short, effectiveness refers to how the process is conducted, whether it is cost-effective, and whether it is appropriately labor-intensive. Efficiency refers to how well the system provides a quality match between available soldiers and available positions. Ideally, the system will be conducted in a cost-effective manner that is not excessively labor-intensive and results in good matches between soldiers and positions so that both the soldier and gaining command are satisfied.

The Army's assignment process, using EDAS, is relatively effective. EDAS leverages certain benefits of technology to automate much of the process including matching soldiers to requisitions, nominating qualified soldiers to requisitions, and transmitting assignment instructions. And, the process provides appropriate screens by assignment managers at PERSCOM and personnel specialists at the MPD or PSC of losing commands to verify the qualification and eligibility of soldiers nominated and assigned to fill vacant positions.

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However, as it is currently conducted, EDAS uses a one-sided matching process to nominate soldiers to requisitions. The process places a high premium on the needs of the Army and considers the soldier's preferences only as an afterthought. While the process may be effective in meeting the Army's needs, it risks alienating soldiers unnecessarily and giving them reason to leave the Army. Previously, when the nation's economy marched along at more modest growth rates and offered fewer employment and education options, soldiers were more willing to accept undesirable assignments. Even if they didn't like their assignment, soldiers commonly accepted them as nothing more than an unpleasant and unavoidable consequence of military service.

Today, however, soldiers perceive their opportunities quite differently. They believe the burgeoning economy promises them a wide selection of jobs from which to choose, many requiring shorter hours than in the military, less personal sacrifice, less hazardous conditions, and better pay and benefits. As a result, soldiers are less willing to accept undesirable jobs, and without adequate incentives they leave the military. Rather than reenlisting, they seek employment where they believe they will have more control over their working environment. Compared to 1992, military recruiting has been more difficult, and unprogrammed attrition in the Army has increased. If the Army improved the influence of soldier preferences in the assignment process to better match soldiers to available positions using a two-sided matching process, perhaps the Army, and the other services, could compete more favorably with the private sector as an employer of choice for current and future generations of young Americans.

D.   CHAPTER SUMMARY

The Army's manpower management and personnel proponent systems are necessarily complex to properly man Army forces in support of national security strategy. The Army personnel proponent system consists of eight personnel life-cycle management functions, including distribution, which is the focus of this thesis. Distribution is accomplished using the two-dimensional MILPER system. In peacetime, EDAS is used to perform the reassignment function to place the right soldier in the right place at the right time. EDAS uses a one-sided matching process to meet the Army's needs and places only secondary emphasis on soldier preferences. Using a two-sided matching process may allow the Army to better satisfy soldier preferences and compete more favorably as an employer of choice, while continuing to satisfy the Army's manning requirements and balance readiness with soldier's satisfaction with military service.

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III. STAKEHOLDER ANALYSIS

A. OVERVIEW

Ultimately, the success of any organization, and its processes, depends on its ability to satisfy its stakeholders. "A stakeholder is defined as any person, group, or organization that can place a claim on an organization's attention, resources, or output or is affected by that output." (Bryson) This section identifies and examines the stakeholders of the Army enlisted assignment process, and their perspectives, to help identify areas where greater efficiencies might be gained in the process.

Similar to financial markets, the assignment process has stakeholders who oversee the process, buyers and sellers who participate in it, and a market maker who manages it. Government and military leaders and policy makers, and their organizations, are responsible for ensuring the process supports Army readiness goals. Army agencies and commands that require soldiers to perform their mission are the buyers, or consumers, and the soldiers who provide the necessary manpower are the sellers, or suppliers. The U.S. Total Army Personnel Command (PERSCOM) is the market maker who brings together the buyers (e.g. commands) and sellers (e.g. soldiers) to find the best possible match for each assignment. Indirectly, the President and Congress, and the American public who depend on having a capable and ready military to achieve the national military strategy, could be considered stakeholders. This analysis, however, will focus only on key stakeholders who are directly involved with the assignment process and are affected by its outcomes.

B.   STAKEHOLDER MAP

Stakeholder analysis begins by identifying each key stakeholder and examining their interest in the process. The organizations, groups and individuals that have a direct interest, or stake, in the enlisted assignment process and its outcomes include:

- Assistant Secretary of the Army for Manpower and Reserve Affairs (ASA (M&RA))

- Deputy Chief of Staff for Personnel (DCSPER)

- Commanding General, U.S. Total Army Personnel Command (PERSCOM)

- Assignment Managers

- Local Military Personnel Divisions (MPD)/Personnel Service Battalions (PSB)

- Commanders of Major Army Commands (MACOMs)

- Field Commanders (e.g. Divisions, Brigades, Battalions, etc.)

- Soldiers
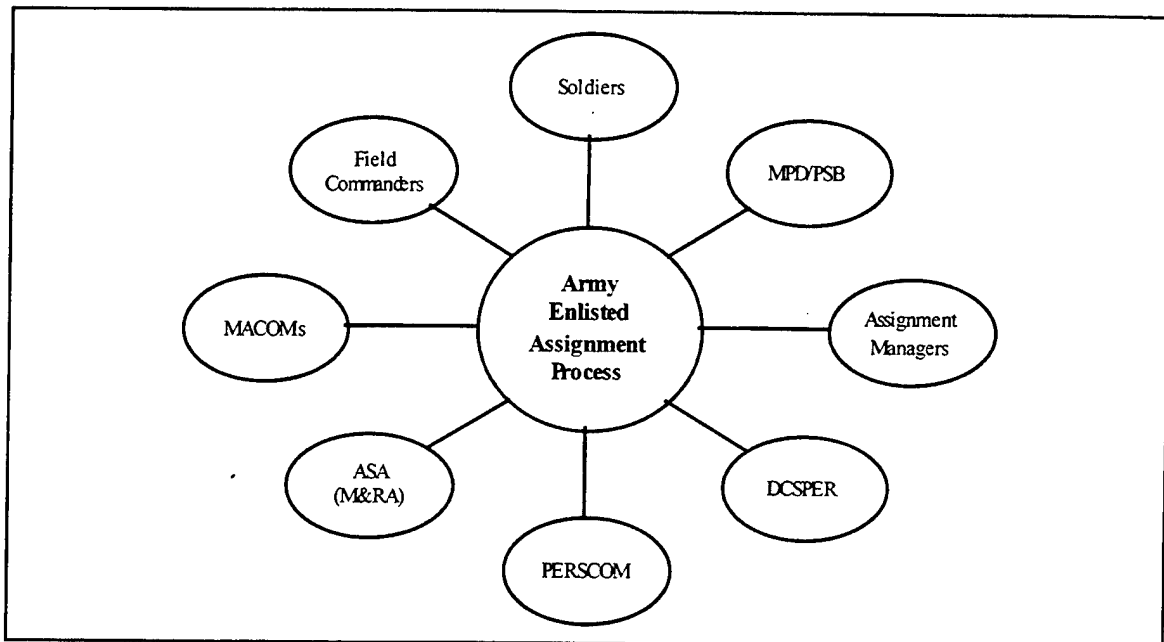
Figure 3.1. Assignment Process Stakeholder Map.

The above stakeholder map depicts the key stakeholders in the enlisted assignment process. They are positioned to show their relationship to the process, and not each other. This helps to focus the analysis on how each stakeholder affects, or is affected by the process, and not on the bureaucracy of reporting relationships and other hierarchical organizational structures.

C.   STAKES

Each of the key stakeholders has a direct relationship to the enlisted assignment process, and their stakes are discussed below. There are numerous individuals and organizations that provide vital services in support of the assignment process and its key stakeholders, but they are not considered in this analysis because their relationship to the process is indirect.

1.   Assistant Secretary of the Army for Manpower and Reserve Affairs

The Assistant Secretary of the Army for Manpower and Reserve Affairs (ASA (M&RA)) oversees assignment policy on behalf of the Secretary of the Army. The Assistant Secretary is responsible for ensuring that assignment policies effectively promote readiness goals and requirements in support of the national defense.

2.   Deputy Chief of Staff for Personnel (DCSPER)

The DCSPER[2] serves as the senior Army policy official for the MILPER system and provides Headquarters, Department of the Army (HQDA) supervision of all personnel policy formulation, programs, goals, architecture, standards, structures and

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[2] The Deputy Chief of Staff for Operations and Plans (DCSOPS) exercises final authority over the resourcing of the MILPER System to include allocating units, manpower authorizations, and funding. For this stakeholder analysis, the influence of the DCSOPS on the daily operations of the assignment process is represented by the DCSPER.

resources. The DCSPER serves as the senior Army policy official for the reassignment processing of all soldiers.

Returning to the analogy of a financial market, the Assistant Secretary and DCSPER provide oversight to ensure that the Army's manpower market functions correctly. They influence the process by developing Army-level policies that are enforced by PERSCOM.

3. Commanding General, U.S. Total Army Personnel Command (PERSCOM)

PERSCOM has functional responsibility for reassigning all soldiers and issuing Assignment Instructions (AI). PERSCOM manages the daily operations of the MILPER system to effectively and efficiently assign soldiers to billets.[3] PERSCOM interprets and implements policies initiated by the DCSPER and manages the distribution of soldiers to support the Army's mission worldwide.

4. Assignment Managers

The rubber meets the road at the assignment manager level. Assignment managers at PERSCOM personally implement soldier assignment policies to fill valid requisitions in EDAS with qualified soldiers. They review the list of soldiers nominated by EDAS for each available position, and either accept a soldier for the assignment or reject all nominees and return the requisition to the selection for new nominations. Assignment managers are primarily concerned with meeting the Army's needs by filling

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[3] The U.S. Army Soldier Support Center (USASSC) is a joint owner in managing the Army's MILPER System. Primarily, USASSC formulates doctrine, combat developments, unit organizational structure and training. USASSC is not directly involved in the daily operation of the assignment process, and is therefore not presented as a key stakeholder. As a joint owner of the MILPER System, the USASSC is represented by PERSCOM in this analysis.

each requisition, and give only secondary consideration to meeting the soldier's preferences.

5.   Local Military Personnel Divisions (MPD)/Personnel Service Battalions (PSB)

Local Military Personnel Divisions and Personnel Service Battalions (or Companies) provide services to soldiers for field commanders.[4] At the battalion level, Personnel Action Centers (PACs) provide soldiers an interface with the personnel support and assignment processes. Soldiers are also able to perform certain functions online, independent of their unit PAC. Ongoing initiatives seek to maximize using the Internet to provide PAC support. These initiatives offer a tremendous opportunity to allow soldiers greater influence over their personal affairs, including their assignment preferences. All of the personnel service centers mentioned above benefit from an assignment system which offers soldiers the best possible support.

With the support of the local personnel service centers, PERSCOM and the assignment managers serve as the market makers in the Army assignment process. They execute the processes that match soldiers with available billets to meet the needs of the Army and individual soldiers and they are keenly interested in having available a system to perform their responsibilities as efficiently and effectively as possible.

6.   Commanders of Major Army Commands (MACOMs)

MACOMs are the first consumers of assignment process output, or assigned soldiers. MACOMs are also responsible for helping to ensure compliance with assignment policies, including submitting enlisted personnel requisitions to PERSCOM

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[4] Military Personnel Divisions (MPD) and Personnel Service Battalions (PSB) are also generically called Military Personnel Offices (MILPO).

and ensuring soldiers within their commands are properly assigned and utilized. Their interest in the process output is two-fold: first, they desire to have sufficient quantities of soldiers to accomplish their assigned missions; second, they desire to have sufficiently high quality soldiers who are skilled and motivated to perform their duties well. Subject to the constraint of how many soldiers are available for distribution Army-wide, getting sufficient quantities presents less of a challenge to the MACOMs than getting satisfactory quality.

7. Field Commanders

Field commanders include commanders of divisions, brigades, battalions, companies and equivalent units that employ soldiers on a daily basis in garrison and operational environments. They are direct consumers of the assignment process. They observe first-hand the benefits of having enough soldiers to accomplish their mission. Ideally, they would like to have 100% of the soldiers they are authorized. In reality, they normally have somewhat less than that. They also observe first-hand the benefits of having high quality soldiers who are motivated to demonstrate high levels of performance. Field commanders also must endure the consequences when the assignment system fails to place the right soldier in the right job at the right time. Field commanders would benefit from an assignment process that meets both of their expectations simultaneously, and having enough high quality soldiers to successfully perform their assigned missions.

8. Soldiers

Soldiers are also direct consumers of the assignment process, and are affected most by its outcomes. Soldiers who excel in their duties usually are those who are

satisfied with their assignment and associated factors, including their duties, assignment location, leadership and quality of life issues affecting them and their families. Most of these factors are represented in their assignment preferences. It is possible to consider them in the assignment process, and it is probable that doing so would increase soldiers' satisfaction and, therefore, their performance.

E.   CHAPTER SUMMARY

Soldiers and commands are the key stakeholders in the Army assignment process, and are the primary consumers of its output and outcome. The desired output is having the right soldier in the right job at the right time. The desired outcome is achieving the highest possible readiness of the involved commands and the Army. Ideally, the process will satisfy all of the stakeholders, but it is especially important to satisfy soldiers and commands. If soldiers and commands are both satisfied by the output of the assignment process, they will likely perform better and achieve higher readiness levels. And, if soldiers' and commands' satisfaction and performance are enhanced, other key stakeholders will also benefit. The objective of this analysis is to assess how well the Army assignment process satisfies the interests of its stakeholders, particularly soldiers and commands, and to determine whether using a two-sided matching process would be beneficial.

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IV. METHODOLOGY

A. OVERVIEW

This section describes the methodology employed in preparing this thesis. Professor Bill Gates first proposed the topic of this thesis, as a part of his research with Professor Mark Nissen, to explore the possibilities of using web-based technologies to improve the Navy's detailing process for enlisted sailors. In the larger study, examining the Army, Air Force and Marine assignment processes is intended to provide useful insight to help identify how the Navy might benefit from lessons learned from its sister services. Simultaneously, the Army and other U.S. military services would gain valuable information that may prove useful in improving their own processes. This thesis seeks to serve both purposes.

Examining the Army's assignment process involved researching the current system using numerous manuals and regulations covering Reassignment, Military Personnel Management, Enlisted Assignments and Utilization Management, and others. The assignment process is only a small, but essential element of the entire Army manpower system. Additionally, current participants in the process from the DCSPER and PERSCOM provided valuable insights. The Army assignment process and its relationship to the larger manpower system are presented in Chapter II.

Further research for this thesis included analyzing the Army assignment process using labor market economics and job-matching theory, comparing the Army assignment process and the Navy detailing process, and simulating a two-sided matching process using a computer model.

B.   LABOR MARKET ECONOMICS

Professors Gates and Nissen's paper, "Designing Agent-based Electronic Employment Markets," provided a valuable framework for analyzing the Army assignment process.   Their paper describes problems with current employment approaches like those used in the U.S. military services and the fundamentals of labor markets including market-based labor markets, hierarchical labor markets and two-sided matching markets.   Finally, it discusses intelligent agent technology and potential benefits of applying it to the challenge of matching workers and jobs, or soldiers and commands.   The following paragraphs draw from the Gates and Nissen paper and present the theoretical framework for the analysis of the Army assignment process in Chapter V.

1.   Hierarchical Planning and Distributed Markets

There are two prevailing methods for matching people with jobs; (1) hierarchical planning and (2) distributed markets.   Centrally planned economies (e.g. former Soviet-style) and command-and-control (e.g. military) organizations generally employ hierarchical planning techniques to match employees to jobs internal to the organization. Typically, U.S. military services use a centralized, hierarchical process to assign their members to jobs that leaves both service members and commands dissatisfied and results in poor morale, performance and retention.

In contrast to hierarchical planning that matches employees to jobs internal to an organization, distributed markets match potential employees and external employers. Unlike in the military, distributed markets are found in labor markets where potential employees are able to move from one employer to another.   In very large or complex distributed labor markets with vast amounts of information available about and to

employees and employers, information overload can be problematic and make it difficult to achieve stability in the system.

Evolving information technology makes it possible to accomplish the job-matching process more effectively and efficiently. Intelligent agents offer excellent potential to help both potential employees and employers find one another in a distributed, electronic marketplace. To realize this potential requires that corresponding markets and technologies be designed together to mutually accomplish the desired results of effective and efficient matching, and conform to the necessary condition that the markets must clear.

2.   Two-Sided Matching Markets

In distributed markets, market wages make it possible to achieve the difficult task of balancing labor supply and demand. The market wage reflects complex interactions between supply and demand forces to achieve supply and demand efficiencies. However, in the military, wages are determined by fiat (e.g. by Congress) and respond very slowly to supply- and demand-driven pressures. Consequently, the Army (and the other U.S. military services) relies on a hierarchical planning process to assign their personnel, and administrative procedures replace wages as the market-clearing mechanism. Yet, the Army could benefit from the efficiencies that are associated with market-based systems, and achievable in two-sided matching markets.

A two-sided matching market assigns individuals to jobs when there are several possible employers and employees. The matching algorithm balances the employers' and employees' preferences, but it can produce assignments that give priority to either employers or employees. As such, the algorithm specifically addresses both demand and

supply efficiency. Two-sided matching algorithms are currently used successfully in assigning medical students to residency programs (Roth and Sotomayor; Roth; and Roth and Peranson) and pledges to sororities at some colleges and universities (Mongell and Roth). (Gates and Nissen)

3. Market Efficiency

In the assignment process, efficiency refers to having appropriately trained soldiers assigned to jobs. There are two components of efficiency: supply and demand.

Supply efficiency concerns soldiers who are supplying labor to the commands, and assigning them to jobs that best meet their desires. When soldiers are satisfied by their assignments, their morale, performance and retention tend to improve. Even the suggestion of compromising the needs of the Army to accommodate a soldier's desires causes discomfort among those who hold traditional views of military service. However, it can be shown that the benefits to the Army, measured in utility, outweigh the costs and do not necessarily sacrifice Army readiness. On the contrary, more satisfied soldiers are likely to be more productive and contribute to even higher readiness than under the current system.

Demand efficiency involves commands that demand the labor, or soldiers. Demand efficiency implies that the commands receive properly trained soldiers when needed to satisfy readiness requirements and accomplish assigned missions, which ultimately meet national security strategy. Ideally, the Army assignment process would achieve supply and demand efficiency simultaneously. Efficiency ultimately relates to maintaining the Army's readiness requirements. When properly trained soldiers occupy the right jobs, the Army is able to operate efficiently.

4. Market Effectiveness

In the assignment process, effectiveness refers to timeliness. When soldiers occupy jobs at the right time, the process is operating effectively. Ineffective processes that result in delays and errors frustrate both sailors and commands. However, effective processes satisfy both, and satisfied soldiers are more likely to reenlist, thereby enhancing the Army's retention goals.

Thus, the assignment process can directly and significantly affect balancing the Army's readiness through efficiency and the Army's retention goals through effectiveness. Pathologies in the enlisted assignment process are those conditions or areas that cause the process to be inefficient or ineffective. Identifying and eliminating the pathologies in the assignment process ensures it achieves its desired outcomes – achieving Army readiness and satisfying soldiers' desires. (Short) Chapter V will examine the possibility of using a two-sided matching process to achieve these outcomes.

C. COMPARATIVE ANALYSIS

Navy Lieutenant Melissa Short recently completed her graduate thesis, "Analysis of the Current Navy Enlisted Detailing Process," under the guidance of Professor Gates and Commander Bill Hatch, an expert in the Navy's manpower processes and military manpower instructor at the Naval Postgraduate School. Comparing the Army's and Navy's processes revealed interesting and valuable insights about how military personnel might be assigned more efficiently and effectively than current processes allow. The results of this comparison are presented in Chapter V.

D. PROCESS SIMULATION

Finally, a computer simulation of the assignment process provided empirical data suggesting the potential benefits of using a two-sided matching model to improve the assignment process. In their graduate thesis, "Agent-Based Simulation System: A Demonstration of the Advantages of an Electronic Employment Market in a Large Military Organization," Majors Hock Sing Ng and Cheow Guan Soh of the Singapore Armed Forces, designed a computer model to simulate two-sided matching of sailors and commands. The Agent-Based Employment Market Simulator (ABEMS) model calculates the total and average utility of sailors and commands as a measure of their satisfaction with the process outputs. If further allows the user to specify either command- or sailor-bias, which impacts the resulting utility of sailors and commands. The model provides a useful tool for estimating the potential benefits of a two-sided matching process for a randomly generated set of sailors and commands with simulated preferences and priorities. It was also possible to manually calculate the utility of the same sailors and commands in one-sided matching scenarios, which provided a useful basis for evaluating the value of both systems.

E. CHAPTER SUMMARY

The methodology used to prepare this thesis provided the background, theoretical framework and tools necessary for analyzing the Army assignment process. They will be used in the following chapter to examine components of the Army system that contribute positively to its efficiency and effectiveness, and those that do not.

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V.   ANALYSIS OF FINDINGS

A.   OVERVIEW

The Army operates a centralized, hierarchical assignment process in support of Army manpower management objectives. The Enlisted Distribution Target Model (EDTM) is designed to achieve this goal, but it falls short in several respects. It effectively assigns soldiers to jobs at the right time to meet the Army's needs; soldiers receive timely orders and report for their new assignment when the Army needs them. However, it often fails to efficiently match soldiers and commands according to their preferences, and this chapter discusses why the process fails. It then compares the Army assignment process to the Navy detailing process to learn about best practices used by both services, and demonstrates the potential benefit of using a two-sided matching process to assign soldiers and sailors. Making the process more efficient offers the prospects of enhancing both soldier and command satisfaction with the process, thereby improving their satisfaction and subsequent performance, which directly ensures command mission accomplishment and future Army readiness.

B.   ONE-SIDED MATCHING PROCESS

The Army uses the one-sided matching process in the Enlisted Distribution Assignment System (EDAS), discussed in Chapter II. The desired assignment process output balances two sometimes-conflicting goals: assigning the right soldier to the right billet at the right time, and simultaneously satisfying soldier and command preferences. This output leads to the desired outcome of satisfied soldiers and commands, high levels of readiness and morale, and an Army capable of accomplishing its missions in support of national security strategy. Chapter IV discussed the principles of market efficiency

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and effectiveness. Because wages are determined by fiat, the Army's internal labor market lacks a market-clearing mechanism that is propelled by market forces. If permitted to respond to labor market forces of labor supply and demand, wage rates tend toward equilibrium and balance labor supply and demand. Higher wage rates result in less demand for labor because it is relatively more expensive than other inputs, and higher wage rates increase the supply of labor because more workers are willing to work for a higher wage. Wages capture the vast amount of information that workers use to determine which jobs they prefer and are willing to accept, and employers use to determine the quantity and quality of labor they will demand. Eventually, market wages adjust and ensure equity between labor supply and demand. Because military wages are not subject to normal market forces, the Army uses a centralized, hierarchical process to balance labor supply and demand and mimic the results of market-based labor markets.

At the core of the problem resulting in process inefficiencies is the one-sided matching process in EDAS that is heavily biased in favor of commands, at the expense of soldiers. EDAS is well suited to achieving effectiveness goals and ensuring soldiers occupy billets at the right time, subject to manpower constraints and prioritization of certain billets. Although frustrated by chronically having fewer soldiers available than authorized, commands are satisfied overall. And, soldiers normally receive assignment instructions in advance of their required move, allowing them to plan accordingly. Frustration and dissatisfaction arises for soldiers, however, when they regularly receive assignments that fall short of meeting their expectations. Commands have little incentive to support changing the system that is already biased in their favor. Perhaps commands would enthusiastically lend their support if the new system offered soldiers who are more

satisfied with their assignment and are likely to perform better, without risk of reducing the systems effectiveness.

Soldiers understand the preeminence of the Army's mission accomplishment and therefore can accept assignments different than those desired or expected. However, soldiers want to be treated as a valuable commodity, and not just a body filling a billet or a name removing a requisition from EDAS. (Short) When matched efficiently with assignments they prefer, soldiers' expectations are met about operations tempo and quality of life issues affecting the soldiers and their families. Soldiers are then more satisfied with the frequency of deployments, resources available for training, quality of leadership and perceived opportunities for personal and professional development. A soldier's pay does not change from one assignment to another, except for airborne and other special assignments. Simply meeting a soldier's expectations increases his or her satisfaction, increasing individual and organizational performance, which directly enhance unit readiness.

C.   TWO-SIDED MATCHING PROCESS

Soldiers have much to gain from improving the efficiency of the assignment process. A two-sided matching process would give greater emphasis to soldier preferences, improving their satisfaction with assignments. A two-sided matching process determines assignments according to rank order preferences for soldiers over commands and commands over soldiers. The soldier-biased approach begins by tentatively assigning each soldier to his or her preferred command. When there are conflicts (multiple soldiers to the same command), the commands' rank-ordered preferences are used to break ties (the soldier the command ranks highest, among those

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tentatively assigned, remains tentatively assigned). Any unassigned soldiers are then tentatively assigned to their next choice, again with command preferences breaking ties. This process continues until all soldiers are either assigned to a command or are unassigned but have exhausted their preference list, and there are no conflicts. This outcome is stable and has the highest utility for the soldiers. Stability implies that both the soldier and command consider the centrally determined match to be at least as desirable as matches that could be arranged outside the two-sided matching process. A match is unstable if a soldier and command both prefer one another to the respective command and soldier with which they are centrally matched; the soldier and command would both prefer to form their own agreement (e.g. the commander might call the assignment manager to request the soldier). Stable equilibrium can emphasize the soldier's preferences, the command's preferences, or potentially provide an intermediate solution. (Gates)

D. INTELLIGENT AGENTS

The Office of Naval Research (ONR), also called Naval Personnel Research, Science and Technology (NPRST), is sponsoring research at the Naval Postgraduate School (NPS) and elsewhere to redesign the Navy's enlisted distribution management system. The NPS research effort, of which this thesis is a part, involves two research thrusts: designing a Web-based virtual marketplace to replace the existing labor-intensive assignment process, and developing an assignment algorithm (e.g. two-sided) to match enlisted personnel with commands. (Gates and Nissen) The virtual Web-based marketplace, referred to as the Personnel Mall, will exploit existing intelligent mall concepts, in which intelligent software agents serve as information brokers between buyers (e.g. commands) and sellers (e.g. soldiers). Software agents representing the

soldiers will interact with software agents representing the commands, through broker agents, to determine the job assignments that match the soldiers' preferences and the Army's needs as closely as possible.

The following section presents evidence that the overall satisfaction of soldiers and commands increases when using a two-sided matching process that could be employed in a Web-based Personnel Mall.

E.   SIMULATION RESULTS

The Agent-Based Employment Market Simulator (ABEMS) provides a useful tool for estimating the benefit of using a two-sided matching process to assign soldiers instead of a one-sided process.

ABEMS calculates the total and average utility of soldiers and commands as a measure of their satisfaction with the process outputs. ABEMS allows the user to specify either a command- or soldier-bias, which impacts the resulting utility of the soldiers and commands. Table 5.1 shows the results of two iterations of a two-sided matching process. The first iteration had a command bias. The second iteration had a soldier bias. Also illustrated are the utilities of the same soldiers and commands matched by the two-sided process, manually calculated for comparison using a one-sided matching process similar to the one used by EDAS. Their combined utility is also presented for each scenario. Normally, it is not possible to add the utility scores of different groups. However, because the utility functions for commands and sailors were derived for this simulation to represent the value of the match to each party, it is possible to add their utility scores here.

	Command Utility	Soldier Utility	Combined
Two-Sided Match			
Command Bias	3.66	3.30	6.96
Soldier Bias	.3.54	3.53	7.06
One-Sided Match			
Command Bias	3.95	2.72	6.67
Soldier Bias	3.38	3.74	7.12

Table 5.1. ABEMS Computer Simulation Results

The two-sided matching process in ABEMS simulates the difficult challenge of assigning over 100,000 soldiers annually in the Army. For the simulations conducted for this thesis, ABEMS randomly generated 30 soldiers, each with unique preferences and corresponding utility functions, and 45 commands with their own unique preferences and utility functions. The disparity between the number of soldiers and commands is intended to simulate chronically having fewer soldiers available than authorized billets. Utility scores range from one to five, with a score of five for a perfect soldier-command match. ABEMS automatically conducts the two-sided matching process and calculates the resulting utility for soldiers and commands. Using the same soldiers and commands from the two-sided matching processes, it was possible to manually calculate the

expected outcome of a one-sided match like the one used in EDAS. The results are interesting and support the hypothesis that the two-sided process is superior.

As suggested previously, commands obtain the highest utility in a command-biased one-sided match process, with a score of 3.95 in this simulation. In the same simulation, soldiers experience the lowest utility with a score of 2.72. Their combined utility is the lowest of all four scenarios, with a score of 6.67. It is predictable that in a one-sided match, the utility outcome will always favor whoever benefits from the bias.

In a two-sided match, again the bias affects the resulting utility of soldiers and commands. In the simulated two-sided match with command bias, commands obtain an average utility of 3.66, and soldiers obtain a utility of 3.30. Their combined utility is 6.96. This suggests that if the Army transitioned to a two-sided matching process for assigning soldiers and retained the current command bias, command utility would continue to exceed soldier utility, but it would decrease and, hence, commands would derive less satisfaction from the system. However, soldiers would experience significant increases in average utility, and the combined utility of soldiers and commands would increase. Although the commands would sacrifice some utility, the Army would benefit as a whole.

The soldier-biased two-sided matching results are even more intriguing. Commands and soldiers obtain approximately equal utility, 3.54 and 3.53, respectively, and their combined utility of 7.06 is higher than the two-sided match with a command bias. This result suggests that the soldier-biased two-sided match might be the most effective and efficient way to balance Army requirements and readiness with soldiers' professional development needs and personal preferences.

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The results of these simulations do not carry the weight of statistically valid research, and are not intended to do so. They are only intended to suggest that, in fact, there exists an opportunity to improve the current Army assignment system to benefit soldiers, commands and other stakeholders responsible for ensuring Army readiness in support of the national security strategy.

F.   COMPARATIVE ANALYSIS: BEST PRACTICES

Recently, Navy Lieutenant Melissa Short completed her graduate thesis, "Analysis of the Current Navy Enlisted Detailing Process," in support of the research being conducted by Professors Gates and Nissen at the Naval Postgraduate School. Objectives of their research include examining the assignment processes of all the U.S. military services, identifying the best practices of each, discovering the most effective and efficient methods to achieve the services' assignment objectives. This section compares the best practices of the Army assignment process and the Navy detailing process.

Predictably, the two systems are similar. They are both centrally planned hierarchical systems designed to serve large military organizations, and both leave many parties (e.g. soldiers, sailors and commands) dissatisfied, which results in poor morale, performance and retention. Also, their stakeholders are similar, including their service chiefs and other policy-makers, personnel commands that operate the systems, and commands, sailors and soldiers who are matched in the processes. The Army and Navy determine requirements and allocate their manpower resources to commands similarly, according to their established priority. The Army and Navy diverge, however, in two critical areas: (1) obtaining and attempting to satisfy individual preferences, and (2)

automating the matching process. Neither service performs either of these areas perfectly; both could benefit by learning from the other's practice. The following sections describe these two areas, and how they differ between the services.

1.   Individual Preferences

The Navy commits far more resources than the Army trying to satisfy enlisted sailors' individual preferences. In addition to detailers, who are the equivalent of Army assignment managers and responsible for matching sailors to requisitions, the Navy uses Command Career Counselors (CCC) and the Job Advertising and Selection System (JASS). JASS is an online information and decision support system for sailors, Command Career Counselors and detailers. Command Career Counselors are assigned to commands and assist sailors in selecting available jobs that are best suited to their personal and professional interests. At their convenience, sailors around the world view posted prioritized billets, and apply for them through their CCC. Prior to JASS, sailors had to negotiate with detailers via the telephone. Before the Navy introduced JASS in 1995, there was no similar tool for optimizing the Navy's priorities and sailors' desires.

JASS permits sailors to view jobs available in their pay grade and rating (grade and MOS in the Army) or Navy Enlisted Code (NEC). View-only JASS allows sailors to see, but not apply for, all available jobs in the current requisition cycle. This initiative allows sailors to go on-line in the comfort of their homes or work spaces to explore available jobs. Sailors can see available positions, research alternatives, and discuss options with their family. Ultimately, this information system allows sailors to make informed, sagacious decisions regarding their next duty assignment.

Only Command Career Counselors, or those designated by their Commanding Officer as career counselors, have the required access to make job applications. Command Career Counselors are involved for two reasons. First, they ensure that the sailors are eligible and qualified for the positions to which they are applying. Second, Command Career Counselors are fully engaged in the advisory role for sailors' careers. View-only JASS offers sailors flexibility and convenience.

Most important, JASS offers sailors an interactive way to provide direct input into their assignments. JASS is more robust than the Army's current system, which allows soldiers only to indicate a preference for geographic regions and major Army posts. Soldiers learn their specific job assignment from their Command Sergeant Major only after they arrive at their new duty stations. In some cases, senior noncommissioned officers learn of their positions in advance through personal contacts or their assigned sponsor, but there is no formal system for informing them prior to arrival. Only now is the Army developing a tool, similar to JASS, which will enable soldiers to participate more actively in the assignment process. It may not be practicable, however, for the Army to make information about specific jobs available to soldiers. This type of centralization is not necessary for assigning enlisted soldiers in the Army's system. Instead that function is best performed locally by Command Sergeants Major who are responsible for managing and developing enlisted soldiers.

2.   System Automation

While JASS is an impressive tool for communicating with sailors and enabling them to participate in the assignment process, there are several weaknesses. First, sailors apply for up to five assignments and they expect to receive their first choice; they are

frequently disappointed when they do not. The most significant weakness results because JASS is not compatible with the Navy's Enlisted Personnel Requisition System (EPRES) or the Enlisted Assignment Information System (EAIS). EPRES and EAIS serve functions similar to those of the Army's EDAS. EPRES generates requisitions when a command's projected manning in a particular rating (MOS) and rate (pay grade) falls below projected Navy Manning Plan (NMP) levels. Requisitions are then downloaded into EAIS where they appear according to priority, and detailers review them. Unlike EDAS, however, EAIS does not automatically nominate sailors to fill requisitions. Instead, detailers must manually select sailors to fill each requisition.

Figure 5.1 illustrates that detailers must account for many factors when matching sailors to requisitions, without assistance from a system similar to EDAS. Currently, the Navy has no single tool to help detailers "mentally juggle" diverse policies, procedures and information to ensure that the right sailor with the necessary skills is assigned to the right job on time.
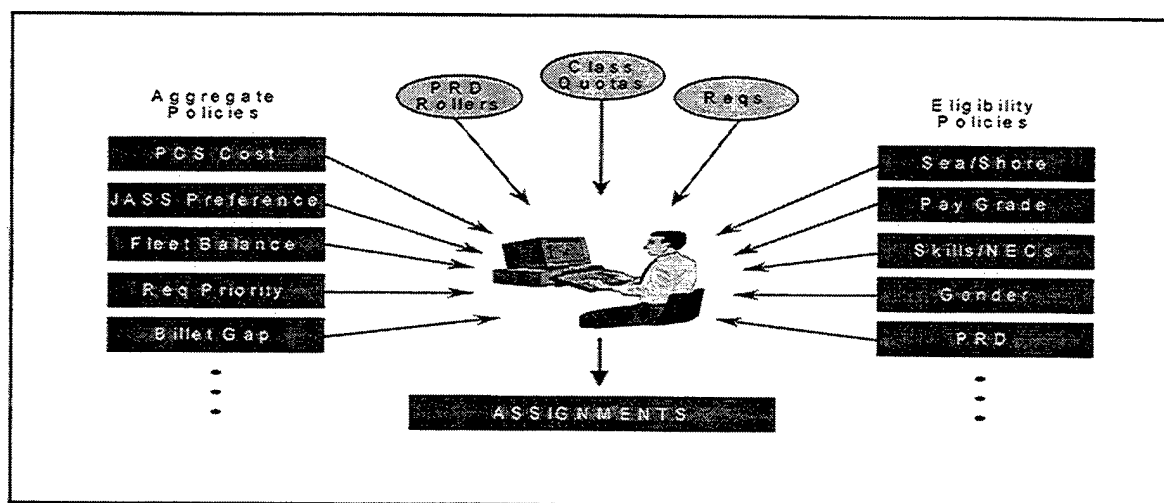
Figure 5.1. Navy Detailer Considerations.

From: Navy Personnel Research, Studies and Technologies, March 2000

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Detailers continually struggle to manage the Navy's requirements and the sailor's wishes, and perhaps a system that automates the matching process would be valuable to Navy detailers and improve the efficiency of the Navy assignment system. It is important to remember that EDAS uses a one-sided matching process, the results of which could be improved by using a two-sided process. However, EDAS does eliminate much of the labor-intensive work for Army assignment managers that Navy detailers must perform.

G. CHAPTER SUMMARY

This chapter has demonstrated the limitations of using a one-sided matching process in the Army's assignment process. It leads to inefficient outputs that fail to satisfy soldiers' desires, decreasing morale, performance and retention, and possibly compromising Army readiness. Using a two-sided matching process more efficiently mimics market forces normally captured in wages and increases overall satisfaction with the assignment process. Both the Army and Navy, and perhaps the other U.S. military services, would benefit from using a two-sided matching process to assign enlisted personnel. Additionally, the services could benefit by learning from each other's best practices. Although imperfect in their current form, the Navy aggressively tries to learn and satisfy sailors' assignment preferences using JASS, and the Army uses an automated matching process to eliminate many manual procedures using EDAS. Integrating the interactive capabilities of JASS with a two-sided process in EDAS would enable the services to effectively and efficiently balance their readiness needs with individual preferences, and satisfy their stakeholders better than the current system allows.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. RESEARCH QUESTIONS AND ANSWERS

1. Primary Research Question

What is the overall efficiency and effectiveness of the Army's current assignment process? The Army's assignment process effectively accomplishes its most basic mission: it assigns soldiers to billets. However, using a one-sided matching process may not be the most efficient method. This thesis shows how implementing a two-sided matching process will offer the opportunity to make the system more efficient, and better satisfy its stakeholders.

2. Subsidiary Research Questions

Who are the stakeholders in the assignment process, and what are their concerns? The eight stakeholders are: (1) the Assistant Secretary of the Army for Manpower and Reserve Affairs (ASA (M&RA)); (2) the Deputy Chief of Staff for Personnel (DCSPER); (3) the U.S. Total Army Personnel Command (PERSCOM); (4) PERSCOM Assignment Managers; (5) Local Military Personnel Divisions (MPDs) and Personnel Service Battalions (PSBs) and Companies (PSCs); (6) Major Army Commands (MACOMs); (7) Field Commanders (e.g. Divisions, Brigades, Battalions, etc.); and (8) soldiers. Their collective primary concern is ensuring Army readiness by placing the right soldier in the right job at the right time. This contrasts slightly with the Navy's concept of the R^4 Sailor: the right sailor with the right skills in the right job at the right time. The Navy specifies the need for sailors to have the right skills, which the Army implies when describing the right soldier. Commands are particularly concerned with the system output, and receiving sufficient quality and quantities of soldiers to accomplish their

mission in support of the national security strategy. Soldiers are particularly concerned with the system satisfying their personal and professional needs while serving the needs of the Army.

What positive aspects of the Army's assignment process should be preserved? The single most positive aspect of the Army's assignment process is its use of the Enlisted Distribution Assignment System (EDAS), an automated matching process. Despite its inability to achieve the same efficiency as a two-sided matching process it contributes positively to the Army's ability to meet its manpower and manning objectives.

What pathologies, or deviations from an efficient process exist, and what are their effects on retention? The Army assignment system inadequately accounts and attempts to satisfy individual soldiers' personal and professional desires. Soldiers today face many opportunities outside the Army, and in order to retain them, the Army must do more to satisfy their preferences and become an employer of choice. The Army now finds itself engaged in a "war for talent" in an economy boasting unprecedented levels of prosperity, and the Army must improve to compete favorably in the future.

What comparisons can be made between the Army and Navy assignment processes? The Army and Navy assignment processes are similar, and share similar objectives. However, important differences exist between how they incorporate individual preferences into the assignment process, and how they automate it. The Army will do well when it brings online its system similar to the Navy's JASS, and the Navy would benefit from incorporating the benefits of JASS into an automated matching process similar to the Army's EDAS. Both, however, would improve the efficiency of their assignment process by developing and using a two-sided matching model.

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B.   RECOMMENDATIONS

There is a need for a more efficient and effective assignment process in the Army. The Army must immediately respond to how it gathers and uses soldier assignment preferences. Increased satisfaction with the assignment process directly leads to improved morale, performance and retention. Using a two-sided matching model will enable the Army to more effectively balance its requirements and readiness with soldiers' professional needs and personal preferences. Specifically, to improve the assignment process, the Army should:

- Implement an online, interactive tool enabling soldiers to submit assignment preferences.

- Incorporate a two-sided matching model into Enlisted Distribution Assignment System (EDAS) to improve process efficiency.   .

C.   AREAS FOR FURTHER RESEARCH

Should the military pay system be changed and allow wages to act as a market-clearing mechanism for the military labor market? Would it be feasible?

Is it cost effective to implement an online, interactive tool enabling soldiers to submit assignment preferences?

What is the overall efficiency and effectiveness of the Army's current assignment process for officers?

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APPENDIXES

APPENDIX A: ACRONYMS

ABEMS – Agent-Based Employment Market Simulator

AI – Assignment Instructions

AIT – Advanced Individual Training

ASA (M&RA) – Assistant Secretary of the Army for Manpower and Reserve Affairs

BT – Basic Training

CCC – Command Career Counselors

CONUS – Continental United States

DA – Department of the Army

DCSPER – Deputy Chief of Staff for Personnel

DMDC – Defense Manpower Data Center

EAIS – Enlisted Assignment Information System

EDAS – Enlisted Distribution Assignment System

EDTM – Enlisted Distribution Target Model

EPRES – Enlisted Personnel Requisition System

ETS – Expiration Term of Service

HQDA – Headquarters, Department of the Army

JASS – Job Advertising and Selection System

MACOM – Major Army Command

MILPER – Military Personnel System

MILPO – Military Personnel Office

MPD – Military Personnel Division

MOS – Military Occupational Specialty

MOSLS – MOS Level System

MTOE – Modified Table of Organization and Equipment

NEC – Navy Enlisted Code

NMP – Navy Manning Plan

NPRST – Naval Personnel Research, Science and Technology

NPS – Naval Postgraduate School

ONR – Office of Naval Research

PAC – Personnel Action Center

PBG – Program Budget Guidance

PCS – Permanent Change of Station

PERSCOM – U.S. Total Army Personnel Command

PMAD – Personnel Manning Authorization Document

PPBS – Planning, Programming and Budgeting System (DoD)

PPBES – Planning, Programming, Budgeting and Execution System (Army)

PRD – Projected Rotation Date

PSC – Personnel Service Company

R^4 – Right sailor, with the Right skills, in the Right job, at the Right time

Req – Requisition

SQI – Skill Qualification Identifier

TAA – Total Army Analysis

TDA – Table of Distribution and Allowances

TIS – Time in Service

UIC – Unit Identification Code

APPENDIX B: RESULTS OF TWO-SIDED COMMAND-BIASED MATCHING PROCESS

Results of Two-Sided Command-Biased Matching Process

Match		Command		Soldier	
Command	Soldier	Preference	Utility	Preference	Utility
1	7	1	4.2786	4	3.8291
2	23	10	1.5589	3	3.2261
3	14	3	3.8718	6	3.0079
4	21	1	3.0819	1	3.1907
5	17	7	1.9599	1	4.4905
6	29	1	3.9260	2	1.8056
7	27	3	4.7382	3	3.0298
8	No Match				
9	25	2	4.1899	1	5.0000
10	1	6	3.1883	2	3.9347
11	No Match				
12	No Match				
13	No Match				
14	No Match				
15	22	5	3.1645	4	2.9168
16	No Match				
17	2	1	3.8073	6	2.5552
18	No Match				
19	5	1	4.5263	1	3.0977
20	No Match				
21	No Match				
22	28	4	3.1842	3	1.0402
23	19	2	3.9839	4	3.6281
24	9	1	5.0000	1	4.9004
25	30	1	4.7302	2	3.7466
26	No Match				
27	6	4	3.9697	1	2.8738
28	No Match				
29	3	1	2.4267	1	4.9784
30	15	1	4.1423	1	4.3600
31	13	3	4.2532	2	1.3710
32	No Match				
33	18	2	4.5452	6	1.6825
34	24	9	2.9997	2	3.9840
35	11	1	3.7334	2	3.0673
36	No Match				
37	10	1	5.0000	1	3.3459
38	20	5	2.5656	4	3.2803
39	26	3	4.9473	3	3.9205
40	16	10	1.0062	5	2.7022
Total			98.7792		88.9653
Average			3.6585		3.2950

Note: Because of small sample sizes (30 soldiers and 40 commands) not all commands are matched to a soldier.

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APPENDIX C: RESULTS OF TWO-SIDED SOLDIER-BIASED MATCHING PROCESS

Results of Two-Sided Soldier-Biased Matching Process

Match		Soldier		Command	
Soldier	Command	Preference	Utility	Preference	Utility
1	10	2	3.9347	6	3.1883
2	17	6	2.5552	1	3.8073
3	29	1	4.9784	1	2.4267
4	No Match				
5	19	1	3.0977	1	4.5263
6	27	1	2.8738	4	3.9697
7	1	4	3.8291	1	4.2786
8	No Match				
9	24	1	4.9004	1	5.0000
10	37	1	3.3459	1	5.0000
11	35	2	3.0673	1	3.7334
12	No Match				
13	6	1	4.6021	6	2.5619
14	3	6	3.0079	3	3.8718
15	30	1	4.3600	1	4.1423
16	40	5	2.7022	10	1.0062
17	5	1	4.4905	7	1.9599
18	33	6	1.6825	2	4.5452
19	23	4	3.6281	2	3.9839
20	38	4	3.2803	5	2.5656
21	4	1	3.1907	1	3.0819
22	15	4	2.9168	5	3.1645
23	2	3	3.2261	10	1.5589
24	34	2	3.9840	9	2.9997
25	9	1	5.0000	2	4.1899
26	39	3	3.9205	3	4.9473
27	7	3	3.0298	3	4.7382
28	22	3	1.0402	4	3.1842
29	31	1	4.8365	4	2.3140
30	25	2	3.7466	1	4.7302
Total			95.2273		95.4759
Average			3.5269		3.5361

Note: Because of small sample sizes (30 soldiers and 40 commands) not all soldiers are matched to a command.

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APPENDIX D: RESULTS OF ONE-SIDED COMMAND-BIASED MATCHING PROCESS

Results of One-Sided Command-Biased Matching Process

Match		Command		Soldier	
Command	Soldier	Preference	Utility	Preference	Utility
1	7	1	4.2786	4	3.8291
2	16	3	3.2134	No Pref	
3	22	1	4.0293	6	2.3358
4	No Match				
5	1	6	1.9599	8	1.4239
6	29	1	3.9260	2	1.8056
7	5	1	4.7382	7	1.4113
8	No Match				
9	24	1	4.1899	3	4.1899
10	25	2	3.8253	3	3.9234
11	No Match				
12	No Match				
13	No Match				
14	No Match				
15	No Match				
16	No Match				
17	14	2	3.8073	No Pref	
18	No Match				
19	6	2	4.5263	10	1.2393
20	23	1	3.3067	10	2.2334
21	19	2	3.0515	No Pref	
22	No Match				
23	3	1	3.9839	2	4.9507
24	9	1	5.0000	1	4.9004
25	30	1	4.7302	2	3.7466
26	21	1	3.6193	4	1.9468
27	2	2	3.9881	9	1.6715
28	No Match				
29	No Match				
30	No Match				
31	13	3	4.2532	2	1.3710
32	27	3	4.0337	No Pref	
33	18	2	4.5452	6	1.6825
34	11	1	3.9997	No Pref	
35	20	2	3.7334	2	4.4918
36	26	3	4.3672	No Pref	
37	10	1	5.0000	1	3.3459
38	17	9	1.6072	8	1.1766
39	15	1	4.9473	No Pref	
40	No Match				
Total			102.6608		51.6755
Average			3.9485		2.7198

Note: Because of small sample sizes (30 soldiers and 40 commands) not all commands are matched to a soldier.

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APPENDIX E: RESULTS OF ONE-SIDED SOLDIER-BIASED MATCHING PROCESS

Results of One-Sided Soldier-Biased Matching Process

Match		Soldier		Command	
Soldier	Command	Preference	Utility	Preference	Utility
1	9	1	5.0000	3	4.0841
2	1	1	4.1686	2	4.0929
3	29	1	4.9784	1	2.4267
4	No Match				
5	19	1	3.0977	4	2.9094
6	11	5	1.6656	9	3.2742
7	30	1	4.7528	5	3.7747
8	No Match				
9	24	1	4.9004	1	5.0000
10	8	3	2.4464	1	3.9306
11	2	8	2.0981	1	3.4685
12	No Match				
13	6	1	4.6021	4	2.5619
14	3	6	3.0079	3	3.8718
15	33	2	3.7956	1	4.5452
16	40	5	2.7022	10	1.0062
17	5	1	4.4905	7	1.9599
18	19	8	1.5103	9	3.6837
19	23	4	3.6281	2	3.9839
20	38	4	3.2803	5	2.5656
21	4	1	3.1907	1	3.0819
22	30	2	3.4653	4	3.9481
23	35	1	5.0000	10	2.0926
24	34	2	3.9840	9	2.9997
25	10	3	3.9234	2	3.8253
26	7	1	4.6249	10	3.7992
27	15	4	3.0298	3	4.1482
28	27	1	4.7852	7	3.9697
29	31	1	4.8365	4	2.3140
30	37	1	4.0411	3	3.9930
Total			101.0059		91.3110
Average			3.7410		3.3819

Note: Because of small sample sizes (30 soldiers and 40 commands) not all soldiers are matched to a command.

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     Monterey, CA 93943

5.   Major Kip Taylor 1
     1428 Cedar Avenue
     McLean, VA 22101

6.   Captain Todd R. Wasmund 2
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